

In the Claims

1 [0072] 1.(currently amended) An MRI coil apparatus comprising:
2 four members, each member including a superconducting layer, where the members are
3 arranged to form a closed shape having four overlapping regions, and
4 separating dielectric layers interposed between the superconducting layers at the overlapping
5 regions to form built-in capacitors.

1 [0073] 2.(original) The apparatus of claim 1, wherein each member comprises a substrate
2 dielectric layer upon which the superconducting layer was formed.

1 [0074] 3.(original) The apparatus of claim 2, wherein the substrate dielectric layers are rigid.

1 [0075] 4.(original) The apparatus of claim 2, wherein two of the substrate dielectric layers are
2 rigid and two of the substrate dielectric layers are flexible.

1 [0076] 5.(currently amended) The apparatus of ~~any of the preceding claims~~ claim 1, wherein
2 the members are straight.

1 [0077] 6.(currently amended) The apparatus of claims 1, ~~2, 3, or 4~~, wherein two of the
2 members are straight and two of the members are curvilinear.

1 [0078] 7.(currently amended) The apparatus of claims 1, ~~2, 3, or 4~~, wherein two of the
2 members are straight and two of the members are arcuate.

1 [0079] 8.(currently amended) The apparatus of ~~any of the preceding claims~~ claim 1, wherein
2 the substrate dielectric layers are the separating dielectric layers.

1 [0080] 9.(currently amended) The apparatus of ~~any of the preceding claims~~ claim 1, further
2 comprising:

3 a metal layer formed on an exposed portion of a dielectric layer or an external dielectric layer
4 formed form on an exposed portion of a superconducting layer with a metal layer formed on the outer

surface of the external dielectric layer to form coupling or decoupling capacitive elements.

[0081] 10.(original) The apparatus of claim 9, further comprising:

wires bonded to the metal layers, where the metal wires are adapted to link a plurality of the apparatus together to form arrays or to connect the apparatus to a pre-amplifier.

[0082] 11.(original) A hybrid MRI coil apparatus comprising:

two superconducting members, each member including a superconducting layer,
two metal member, and
separating dielectric layers,

where the superconducting members and the metal member are arranged to form a closed shape having four overlapping regions and the separating dielectric layers are interposed between the superconducting layers and the metal members at the overlapping regions to form built-in capacitors.

[0083] 12.(original) The apparatus of claim 11, wherein each superconducting member comprises a substrate dielectric layer upon which the superconducting layer was formed.

[0084] 13.(original) The apparatus of claim 12, wherein the substrate dielectric layers are rigid.

[0085] 14.(original) The apparatus of claim 12, wherein two of the substrate dielectric layers are rigid and two of the substrate dielectric layers are flexible.

[0086] 15.(currently amended) The apparatus of claims 11, ~~12, 13, or 14~~ wherein the superconducting members are straight.

[0087] 16.(currently amended) The apparatus of claims 11, ~~12, 13, or 14~~, wherein the superconducting members are curvilinear.

[0088] 17.(currently amended) The apparatus of claims 11, ~~12, 13, or 14~~, wherein superconducting members are arcuate.

1 [0089] 18.(currently amended) The apparatus of claims 11, ~~12, 13, 14, 15, 16 or 17~~, wherein
2 the substrate dielectric layers are the separating dielectric layers.

1 [0090] 19.(currently amended) The apparatus of 11, ~~12, 13, 14, 15, 16 17 or 18~~, further
2 comprising:

3 a metal layer formed on an exposed portion of a dielectric layer or a external dielectric layer
4 formed form on an exposed portion of a superconducting layer with a metal layer formed on the outer
5 surface of the external dielectric layer to form coupling or decoupling capacitive elements.

1 [0091] 20.(original) The apparatus of claim 19, further comprising:

2 wires bonded to the metal layers, where the metal wires are adapted to link a plurality of the
3 apparatus together to form arrays or to connect the apparatus to a pre-amplifier.

1 [0092] 21.(original) A birdcage-type resonator apparatus comprising:

2 a plurality of coils apparatus including:

3 four members, each member including a superconducting layer, where the members
4 arranged to form a closed shape having four overlapping regions, and
5 separating dielectric layers interposed between the superconducting layers at the
6 overlapping regions to form built-in capacitors, and

7 at least one small animal cavity,

8 where the coil apparatus are arranged around the cavity to permit MRI imaging of an animal placed
9 within the cavity.

1 [0093] 22.(original) The apparatus of claim 21, wherein each member comprises a substrate
2 dielectric layer upon which the superconducting layer was formed.

1 [0094] 23.(original) The apparatus of claim 22, wherein the substrate dielectric layers are rigid.

1 [0095] 24.(original) The apparatus of claim 22, wherein two of the substrate dielectric layers are
2 rigid and two of the substrate dielectric layers are flexible.

1 [0096] 25.(currently amended) The apparatus of 21, ~~22, 23 or 24~~, wherein the members are
2 straight.

1 [0097] 26.(currently amended) The apparatus of claims 21, ~~22, 23, or 24~~, wherein two of the
2 members are straight and two of the members are curvilinear.

1 [0098] 27.(currently amended) The apparatus of claims 21, ~~22, 23, or 24~~, wherein two of the
2 members are straight and two of the members are arcuate.

1 [0099] 28.(currently amended) The apparatus of claims 21, ~~22, 23, 24, 25, 26 or 27~~, wherein
2 the substrate dielectric layers are the separating dielectric layers.

1 [0100] 29.(currently amended) The apparatus of claims 21, ~~22, 23, 24, 25, 26, 27 or 28~~, further
2 comprising:

3 a metal layer formed on an exposed portion of a dielectric layer or a external dielectric layer
4 formed form on an exposed portion of a superconducting layer with a metal layer formed on the outer
5 surface of the external dielectric layer to form coupling or decoupling capacitive elements.

1 [0101] 30.(original) The apparatus of claim 29, further comprising:

2 wires bonded to the metal layers, where the metal wires are adapted to link a plurality of the
3 apparatus together to form arrays or to connect the apparatus to a pre-amplifier.

1 [0102] 31.(original) A birdcage-type resonator apparatus comprising:

2 a plurality of coils apparatus including:

3 two superconducting members, each member including a superconducting layer,

4 two metal member, and

5 separating dielectric layers, and

6 at least one small animal cavity,

7 where the coil apparatus are arranged around the cavity to permit MRI imaging of an animal placed
8 within the cavity and where the superconducting members and the metal member are arranged to
9 form a closed shape having four overlapping regions and the separating dielectric layers are

interposed between the superconducting layers and the metal members at the overlapping regions to form built-in capacitors.

[0103] 32.(original) The apparatus of claim 31, wherein each superconducting member comprises a substrate dielectric layer upon which the superconducting layer was formed.

[0104] 33.(original) The apparatus of claim 32, wherein the substrate dielectric layers are rigid.

[0105] 34.(original) The apparatus of claim 32, wherein two of the substrate dielectric layers are rigid and two of the substrate dielectric layers are flexible.

[0106] 35.(currently amended) The apparatus of claims 31, ~~32, 33, or 34~~ wherein the superconducting members are straight.

[0107] 36.(currently amended) The apparatus of claims 31, ~~32, 33, or 34~~, wherein the superconducting members are curvilinear.

[0108] 37.(currently amended) The apparatus of claims 31, ~~32, 33, or 34~~, wherein superconducting members are arcuate.

[0109] 38.(currently amended) The apparatus of claims 31, ~~32, 33, 34, 35, 36 or 37~~, wherein the substrate dielectric layers are the separating dielectric layers.

[0110] 39.(currently amended) The apparatus of 31, ~~32, 33, 34, 35, 36 37 or 38~~, further comprising:

a metal layer formed on an exposed portion of a dielectric layer or a external dielectric layer formed form on an exposed portion of a superconducting layer with a metal layer formed on the outer surface of the external dielectric layer to form coupling or decoupling capacitive elements.

[0111] 40.(original) The apparatus of claim 39, further comprising:

wires bonded to the metal layers, where the metal wires are adapted to link a plurality of the

3 apparatus together to form arrays or to connect the apparatus to a pre-amplifier.

1 [0112] 41.(currently amended) A small animal MRI apparatus comprising:

2 a vacuum housing including at least one cylindrical cavity adapted to receive a small animal,
3 a coolant reservoir including a coolant, a coolant inlet, a coolant outlet and a cold plate
4 forming an internal end of the reservoir,

5 a resonator ~~of claims 21-40~~ surrounding each cavity ~~or a plurality of coils of claims 1-20~~
6 ~~positioned within the housing to permit MRI imaging of an animal in each of the cavities, where the~~
7 resonator comprises:

8 a plurality of coils apparatus including:

9 four members, each member including a superconducting layer, where the members
10 arranged to form a closed shape having four overlapping regions, and
11 separating dielectric layers interposed between the superconducting layers at the
12 overlapping regions to form built-in capacitors, and

13 at least one small animal cavity,

14 where the coil apparatus are arranged around the cavity to permit MRI imaging of an animal placed
15 within the cavity.

1 [0113] 42.(new) A small animal MRI apparatus comprising:

2 a vacuum housing including at least one cylindrical cavity adapted to receive a small animal,
3 a coolant reservoir including a coolant, a coolant inlet, a coolant outlet and a cold plate
4 forming an internal end of the reservoir,

5 a plurality of coils positioned within the housing to permit MRI imaging of an animal in each
6 of the cavities, where the each coil comprises:

7 four members, each member including a superconducting layer, where the members are
8 arranged to form a closed shape having four overlapping regions, and

9 separating dielectric layers interposed between the superconducting layers at the overlapping
10 regions to form built-in capacitors.